(i) Printed Pages : 2 Roll No. .....

(ii) Questions : 7 Sub. Code : 0 5 4 6

Exam. Code : 0 0 0 6

B.A./B.Sc. General 6th Semester

(2054)

PHYSICS

Paper-C : Nuclear and Particle Physics—II

Time Allowed : Three Hours] [Maximum Marks : 44

Note :— Paper consists of ***seven*** questions comprising of ***three*** Sections. First ***two*** Sections comprise of ***three*** questions each; the ***third*** Section comprises of ***one*** compulsory question of ***ten*** short answer type parts. Student will attempt ***two*** questions from each of the first two Sections and any ***eight*** parts of the compulsory question. The use of non-programmable calculator is allowed.

SECTION—I

1. Discuss the interaction of heavy charged particles with matter. Derive expression for the energy loss and stopping power. 9

2. Explain in detail the principle, construction and working of a scintillation counter. 9

3. (a) Discuss the pair production phenomenon in detail. Also provide Dirac's theory explanation for it. 5

   (b) Write a short note on Bremsstrahlung. 4

SECTION—II

4. (a) Discuss the theory, construction and working of a Van de Graaf generator. 6

   (b) Explain the origin of cosmic ray showers. 3

5. Discuss the salient features of fundamental interactions between elementary particles describing their characteristics, coupling constants and life time etc. in detail. Also give a brief account for interaction carriers for all types. 9

6. (a) What are quarks ? Give a qualitative account of quark model. 5

   (b) Write a short note on the accelerator facilities available in India. 4

SECTION—III

7. Do any ***eight*** parts :—

   (a) What are Van Allen belts ?

   (b) What do you understand by hypercharge ?

   (c) Give few advantages of semiconductor detectors.

   (d) Is parity always a conserved quantum number in elementary particle interactions ?

   (e) What do you understand by multiple coulomb scattering ?

   (f) Define the mass absorption coefficient for gamma rays.

   (g) On what principle do nuclear emulsions work ?

   (h) Does Compton effect depend upon the nature of the scatterer ?

   (i) Distinguish between antiparticles and resonant particles.

   (j) What kind of particles can be accelerated by an electron synchrotron ? $1 \times 8 = 8$